

# FCC TEST REPORT (BLUETOOTH LE4.0)

**REPORT NO.:** RF120910C28-6

**MODEL NO.:** F-04E

**FCC ID:** VQK-F04E

**RECEIVED:** Sep. 10, 2012

**TESTED:** Sep. 19 ~ Oct. 06, 2012

**ISSUED:** Oct. 11, 2012

**APPLICANT:** FUJITSU LIMITED

**ADDRESS:** 1-1, Kamikodanaka 4-chome, Nakahara-ku,  
Kawasaki 211-8588, Japan

**ISSUED BY:** Bureau Veritas Consumer Products Services (H.K.)  
Ltd., Taoyuan Branch

**LAB ADDRESS:** No. 47, 14th Ling, Chia Pau Vil., Lin Kou Dist., New  
Taipei City, Taiwan ( R.O.C. )

**TEST LOCATION:** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei  
Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF120910C28-6	Original release	Oct. 11, 2012

## 1. CERTIFICATION

**PRODUCT:** Mobile Phone  
**MODEL NO.:** F-04E  
**BRAND:** Xi  
**APPLICANT:** FUJITSU LIMITED  
**TESTED:** Sep. 19 ~ Oct. 06, 2012  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**STANDARDS:** FCC Part 15, Subpart C (Section 15.247)  
ANSI C63.10-2009

The above equipment (model: F-04E) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Ivy Lin , DATE : Oct. 11, 2012  
Ivy Lin / Specialist

APPROVED BY : Ken Liu , DATE : Oct. 11, 2012  
Ken Liu / Manager

## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -2.48dB at 13.55859MHz.
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.83dB at 68.07MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

### 2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.19 dB
	200MHz ~1000MHz	3.21 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>EUT</b>	Mobile Phone
<b>MODEL NO.</b>	F-04E
<b>POWER SUPPLY</b>	3.8Vdc (Battery) 5.0Vdc (Adapter)
<b>MODULATION TYPE</b>	GFSK
<b>TRANSFER RATE</b>	1Mbps
<b>OPERATING FREQUENCY</b>	2402 ~ 2480MHz
<b>NUMBER OF CHANNEL</b>	40
<b>CHANNEL SPACING</b>	2MHz
<b>OUTPUT POWER</b>	1.14 mW
<b>ANTENNA TYPE</b>	$\lambda/4$ Monopole antenna with -7.4dBi gain
<b>ANTENNA CONNECTOR</b>	N/A
<b>DATA CABLE</b>	N/A
<b>I/O PORTS</b>	Refer to user's manual
<b>ACCESSORY DEVICES</b>	Battery

#### NOTE:

- The EUT consumes power from the following Li-ion battery.

BATTERY	
<b>BRAND</b>	Fujitsu Limited
<b>MODEL</b>	F28
<b>RATING</b>	3.8Vdc, 2420mAh

- The following accessory is for support units only.

PRODUCT	BRAND	MODEL	DESCRIPTION
Adapter	NTT Docomo	TA08017-B219	I/P: 100-240Vac, 50-60Hz, 220mA O/P: 5.0Vdc, 1800mA

- SW version is R07.1e.
- HW version is V2.1.0.
- IMEI Code: 354022050006473 and 354022050003520.
- The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

### 3.2 DESCRIPTION OF TEST MODES

40 channels are provided to this EUT:

CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480



### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE $\geq$ 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz **RE<1G**: Radiated Emission below 1GHz  
**PLC**: Power Line Conducted Emission **APCM**: Antenna Port Conducted Measurement

**NOTE:** The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on X-plane.

#### RADIATED EMISSION TEST (ABOVE 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture) and packet type.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	PACKET TYPE
0 to 39	0, 19, 39	GFSK	1.0

#### RADIATED EMISSION TEST (BELOW 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture) and packet type.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	PACKET TYPE
0 to 39	39	GFSK	1.0

#### POWER LINE CONDUCTED EMISSION TEST:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture) and packet type.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	PACKET TYPE
0 to 39	39	GFSK	1.0

#### ANTENNA PORT CONDUCTED MEASUREMENT:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	PACKET TYPE
0 to 39	0, 19, 39	GFSK	1.0

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	25deg. C, 65%RH	120Vac, 60Hz	Kay Wu
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Kay Wu
PLC	25deg. C, 65%RH	120Vac, 60Hz	David Huang
APCM	25deg. C, 65%RH	120Vac, 60Hz	Howard Kao

**3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS**

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C (15.247)**

**ANSI C63.10-2009**

**558074 D01 DTS Meas Guidance v01**

All test items have been performed and recorded as per the above standards.

### 3.4 DESCRIPTION OF SUPPORT UNITS

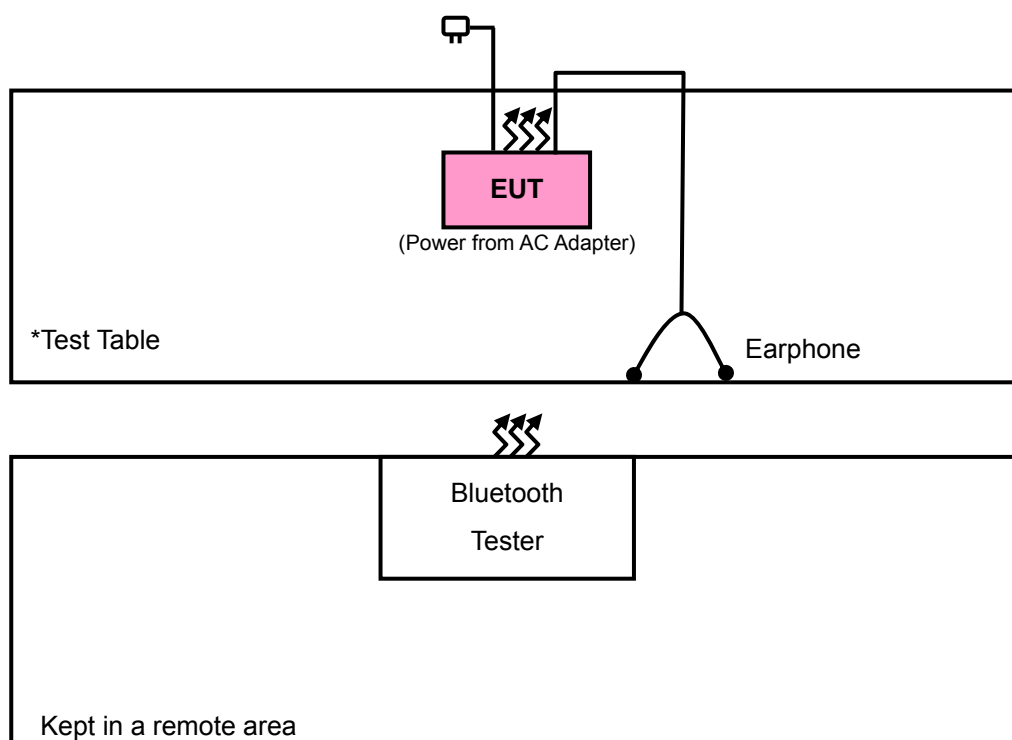
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	EARPHONE	JVC	HA-FX22	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	1.5m audio cable

**NOTE:** All power cords of the above support units are non shielded (1.8m).

#### 3.4.1 CONFIGURATION OF SYSTEM UNDER TEST



## 4. TEST TYPES AND RESULTS

### 4.1 RADIATED EMISSION AND BANDEGE MEASUREMENT

#### 4.1.1 LIMITS OF RADIATED EMISSION AND BANDEGE MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver Agilent	N9038A	MY51210203	Dec. 22, 2011	Dec. 21, 2012
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 21, 2011	Dec. 20, 2012
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Dec. 20, 2011	Dec. 19, 2012
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Dec. 20, 2011	Dec. 19, 2012
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Dec. 20, 2011	Dec. 19, 2012
Preamplifier EMCI	EMC 012645	980115	Dec. 30, 2011	Dec. 29, 2012
Preamplifier EMCI	EMC 330H	980112	Dec. 30, 2011	Dec. 29, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4	Oct. 21, 2011	Oct. 20, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Jan. 02, 2012	Jan. 01, 2013
RF signal cable Worken	RG-213	NA	Jan. 02, 2012	Jan. 01, 2013
Software	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. The test was performed in HwaYa Chamber 9.
  3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
  4. The FCC Site Registration No. is 460141.
  5. The IC Site Registration No. is IC 7450F-4.

#### 4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

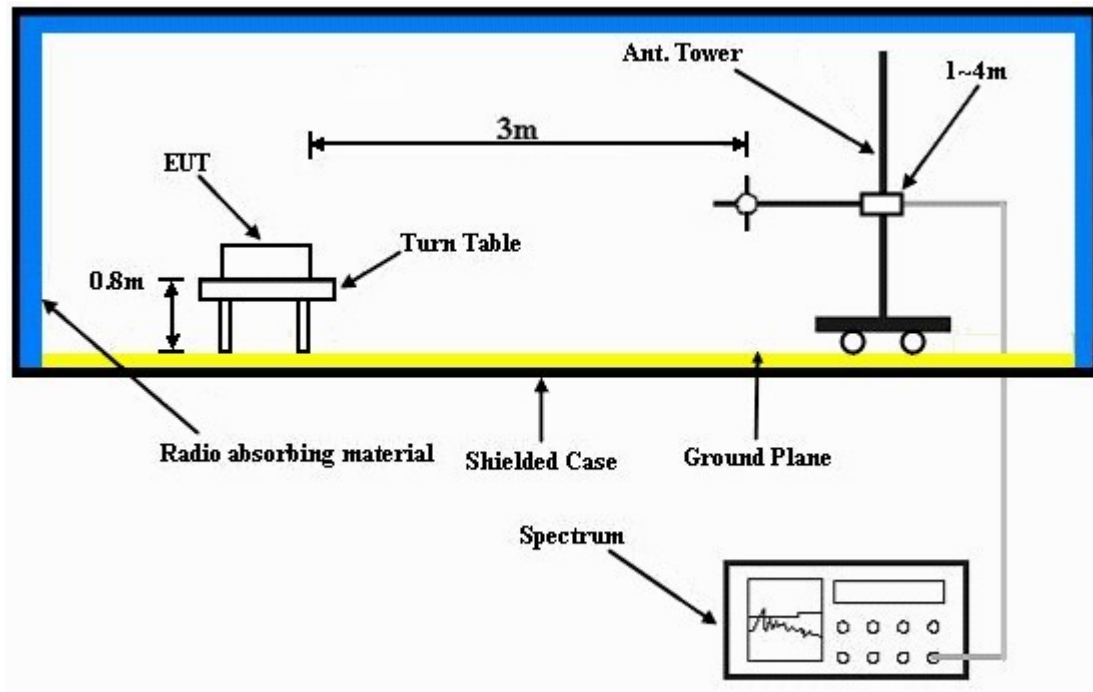
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.1.5 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.1.6 EUT OPERATING CONDITIONS

- Placed the EUT on a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.



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## 4.1.7 TEST RESULTS

## ABOVE 1GHz DATA

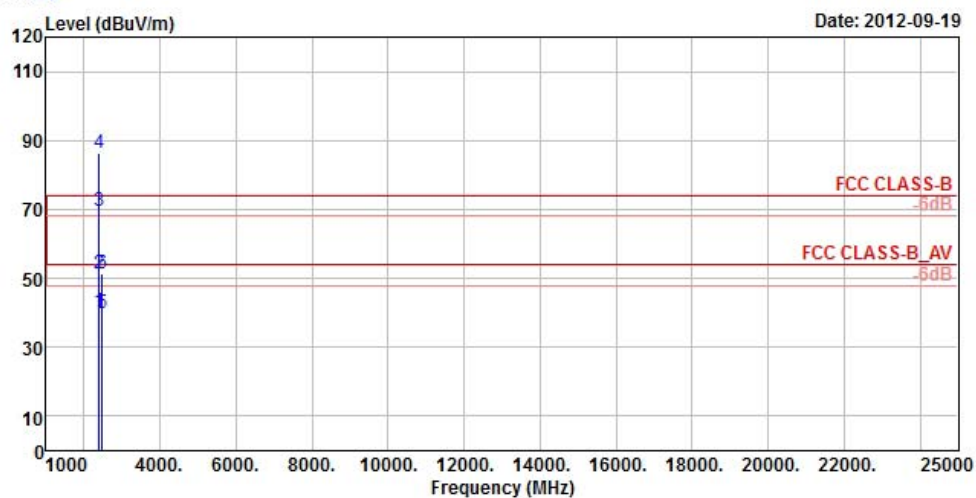


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Data: 19

Date: 2012-09-19



Site : 966 Chamber 5  
Condition : FCC CLASS-B 3m ANT\_18G~40G\_HF HORIZONTAL  
Brand/Model: F-04E  
Remark : BT LE CH00  
Tested by : Kay Wu  
Temperature : 25°C  
Humidity : 65%  
Plane : X

	Freq	Level	Read Level	Limit Line	OverAntenna Limit	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV	dBuV/m	dB	dB/m	dB	dB	cm	deg	
1	2390.00	40.09	45.48	54.00	-13.91	27.26	4.87	37.52	107	168	Average
2	2390.00	51.21	56.60	74.00	-22.79	27.26	4.87	37.52	107	168	Peak
3 pp	2402.00	69.38	74.77			27.26	4.87	37.52	107	168	Average
4 pk	2402.00	86.20	91.59			27.26	4.87	37.52	107	168	Peak
5	2483.50	40.07	44.97	54.00	-13.93	27.50	4.92	37.32	107	168	Average
6	2483.50	51.50	56.40	74.00	-22.50	27.50	4.92	37.32	107	168	Peak





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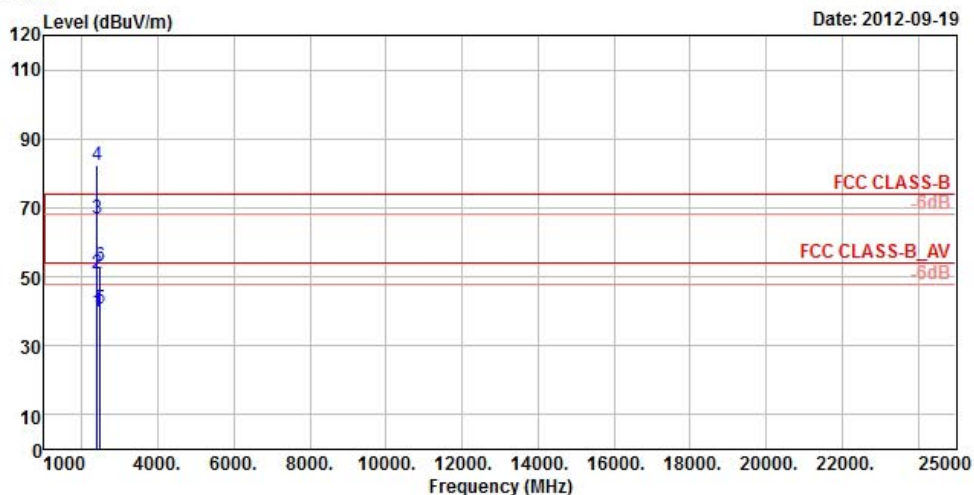


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Data: 20

Date: 2012-09-19



Site : 966 Chamber 5  
Condition : FCC CLASS-B 3m ANT\_18G~40G\_HF VERTICAL  
Brand/Model: F-04E  
Remark : BT LE CH00  
Tested by : Kay Wu  
Temperature : 25°C  
Humidity : 65%  
Plane : X

	Freq	Level	Read	Limit	OverAntenna	Cable	Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	Level	Line	Limit	Factor	Loss	Factor	cm	deg
			dBuV	dBuV/m	dB	dB/m	dB	dB		
1	2390.00	39.91	45.30	54.00	-14.09	27.26	4.87	37.52	102	314 Average
2	2390.00	50.71	56.10	74.00	-23.29	27.26	4.87	37.52	102	314 Peak
3 pp	2402.00	66.80	72.19			27.26	4.87	37.52	102	314 Average
4 pk	2402.00	82.41	87.80			27.26	4.87	37.52	102	314 Peak
5	2483.50	40.83	45.73	54.00	-13.17	27.50	4.92	37.32	102	314 Average
6	2483.50	52.94	57.84	74.00	-21.06	27.50	4.92	37.32	102	314 Peak



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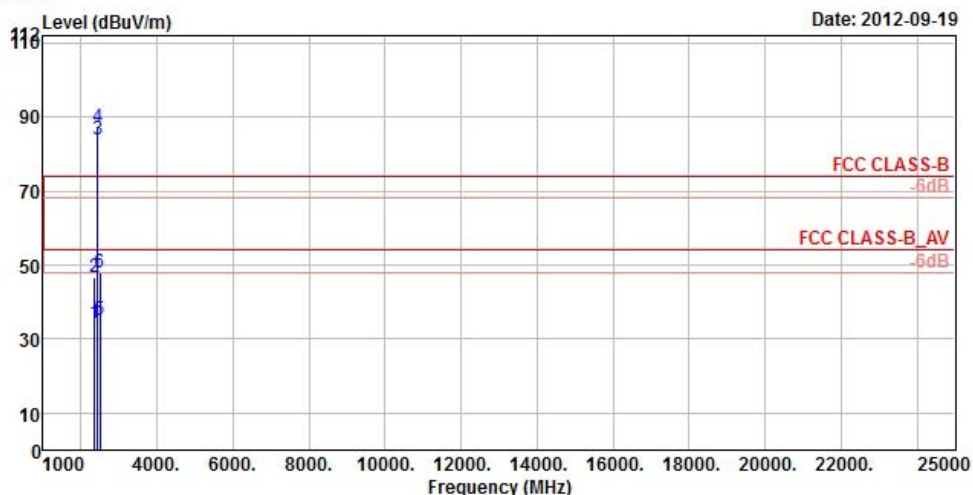


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 19

Date: 2012-09-19



Site : 966 Chamber 5  
Condition : FCC CLASS-B 3m ANT\_18G~40G\_HF HORIZONTAL  
Brand/Model: F-04E  
Remark : BT LE CH19  
Tested by : Kay Wu  
Temperature : 25°C  
Humidity : 65%  
Plane : X

	Freq	Level	Read	Limit	OverAntenna	Cable	Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	Level	Line	Limit	Factor	Loss	Factor		
			dBuV	dBuV/m	dB	dB/m	dB	dB	cm	deg
1	2350.00	34.46	40.02	54.00	-19.54	27.11	4.82	37.49	100	163 Average
2	2350.00	46.83	52.39	74.00	-27.17	27.11	4.82	37.49	100	163 Peak
3 pp	2440.00	83.76	88.93			27.40	4.89	37.46	100	163 Average
4 pk	2440.00	87.10	92.27			27.40	4.89	37.46	100	163 Peak
5	2486.00	35.03	39.93	54.00	-18.97	27.50	4.92	37.32	100	163 Average
6	2486.00	47.84	52.74	74.00	-26.16	27.50	4.92	37.32	100	163 Peak



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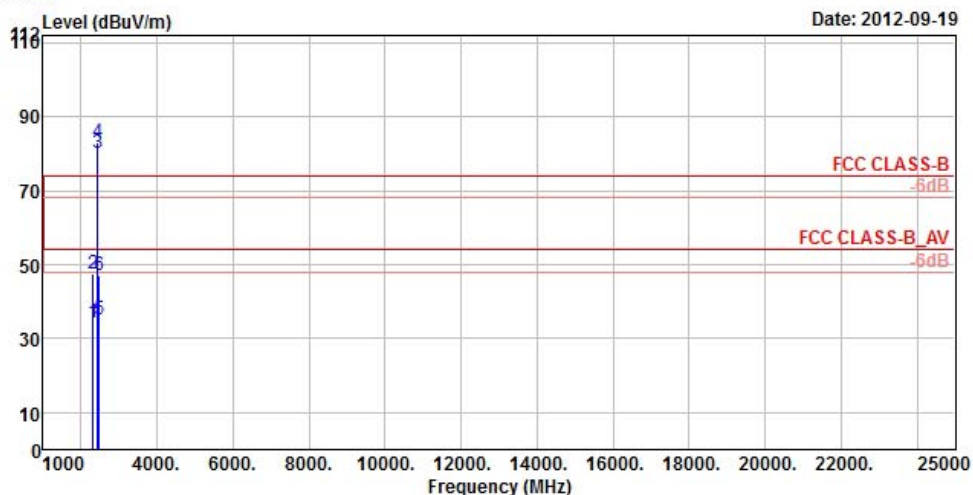


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 20

Date: 2012-09-19



Site : 966 Chamber 5  
Condition : FCC CLASS-B 3m ANT\_18G~40G\_HF VERTICAL  
Brand/Model: F-04E  
Remark : BT LE CH19  
Tested by : Kay Wu  
Temperature : 25°C  
Humidity : 65%  
Plane : X

	Freq	Level	Read	Limit	OverAntenna	Cable	Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	Level	Line	Limit	Factor	Loss	Factor	cm	deg
1	2322.00	34.30	39.92	54.00	-19.70	27.06	4.79	37.47	100	312 Average
2	2322.00	47.63	53.25	74.00	-26.37	27.06	4.79	37.47	100	312 Peak
3 pp	2440.00	80.14	85.31			27.40	4.89	37.46	100	312 Average
4 pk	2440.00	83.18	88.35			27.40	4.89	37.46	100	312 Peak
5	2484.00	35.05	39.95	54.00	-18.95	27.50	4.92	37.32	100	312 Average
6	2484.00	47.26	52.16	74.00	-26.74	27.50	4.92	37.32	100	312 Peak



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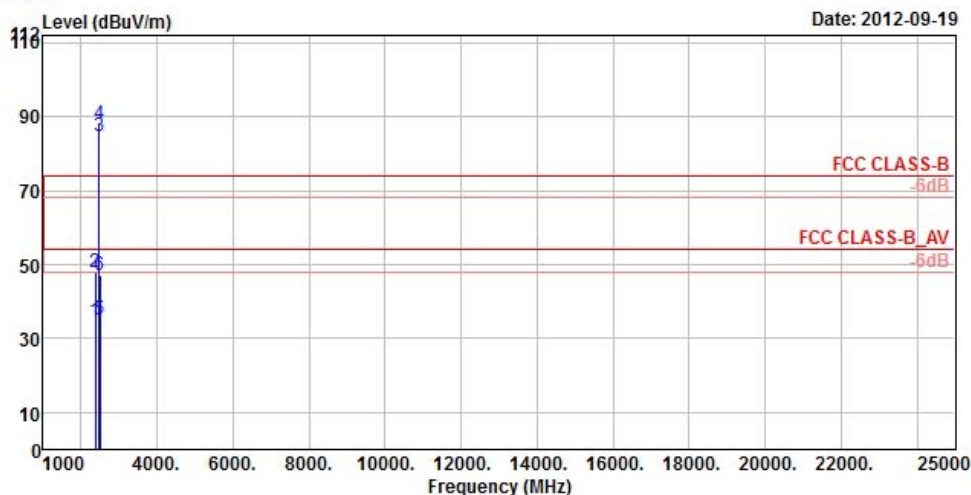


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Data: 19

Date: 2012-09-19



Site : 966 Chamber 5  
Condition : FCC CLASS-B 3m ANT\_18G~40G\_HF HORIZONTAL  
Brand/Model: F-04E  
Remark : BT LE CH39  
Tested by : Kay Wu  
Temperature : 25°C  
Humidity : 65%  
Plane : X

	Freq	Level	Read Level	Limit Line	OverAntenna Limit	Cable Factor	Preamp Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV	dBuV/m	dB	dB/m	dB	dB	cm	deg
1	2374.00	34.52	39.96	54.00	-19.48	27.21	4.85	37.50	101	157 Average
2	2374.00	47.87	53.31	74.00	-26.13	27.21	4.85	37.50	101	157 Peak
3 pp	2480.00	84.77	89.67			27.50	4.92	37.32	101	157 Average
4 pk	2480.00	88.04	92.94			27.50	4.92	37.32	101	157 Peak
5	2492.00	35.15	39.91	54.00	-18.85	27.55	4.94	37.25	101	157 Average
6	2492.00	47.19	51.95	74.00	-26.81	27.55	4.94	37.25	101	157 Peak



A D T

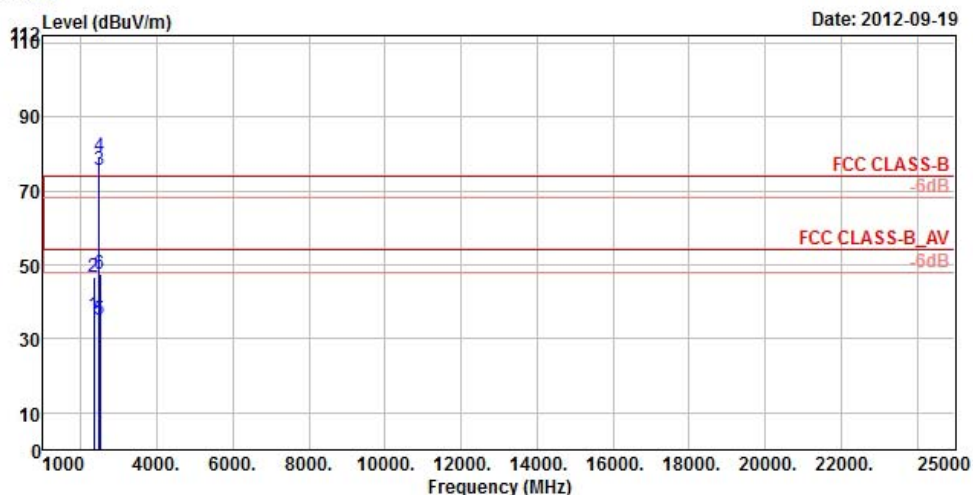


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 20

Date: 2012-09-19



Site : 966 Chamber 5  
 Condition : FCC CLASS-B 3m ANT\_18G~40G\_HF VERTICAL  
 Brand/Model: F-04E  
 Remark : BT LE CH39  
 Tested by : Kay Wu  
 Temperature : 25°C  
 Humidity : 65%  
 Plane : X

	Freq	Level	Read Level	Limit Line	OverAntenna Limit	Cable Factor	Preamp Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV	dBuV/m	dB	dB/m	dB	dB	cm	deg
1	2328.00	36.32	41.94	54.00	-17.68	27.06	4.79	37.47	100	336 Average
2	2328.00	46.80	52.42	74.00	-27.20	27.06	4.79	37.47	100	336 Peak
3 pp	2480.00	75.68	80.58			27.50	4.92	37.32	100	336 Average
4 pk	2480.00	79.17	84.07			27.50	4.92	37.32	100	336 Peak
5	2492.00	35.09	39.85	54.00	-18.91	27.55	4.94	37.25	100	336 Average
6	2492.00	47.33	52.09	74.00	-26.67	27.55	4.94	37.25	100	336 Peak





A D T

## BELOW 1GHz WORST-CASE DATA

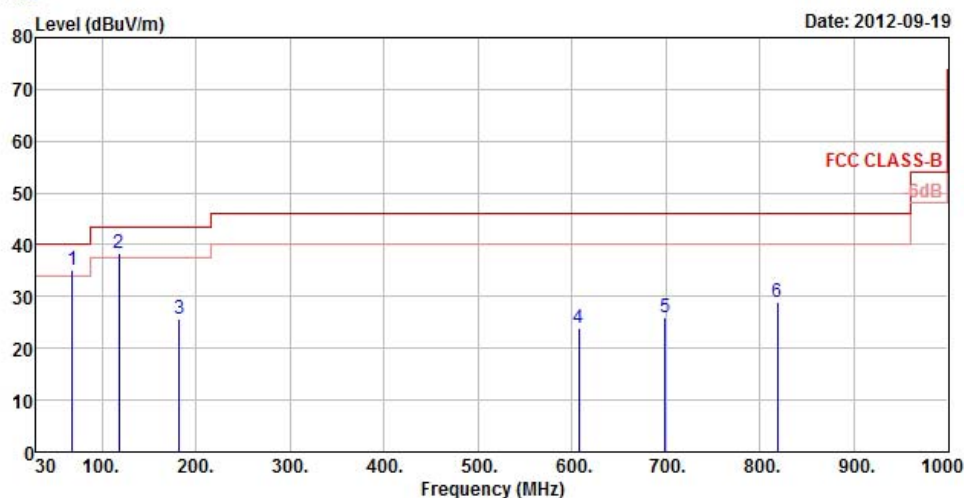


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5

Date: 2012-09-19



Site : 966 Chamber 5  
Condition : FCC CLASS-B 3m ANT\_30M~1G\_LF HORIZONTAL  
Brand/Model: F-04E  
Remark : BT LE LF  
Tested by : Kay Wu  
Temperature : 25°C  
Humidity : 65%  
Plane : X

	Freq	Level	Read Level	Limit Line	OverAntenna Limit	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV	dBuV/m	dB	dB/m	dB	dB	cm	deg	
1 pp	68.07	35.19	55.04	40.00	-4.81	11.00	0.88	31.73	100	227	Peak
2 !	117.75	38.30	58.27	43.50	-5.20	10.74	1.17	31.88	133	221	Peak
3	182.01	25.74	45.44	43.50	-17.76	10.60	1.51	31.81	156	64	Peak
4	607.30	23.97	33.30	46.00	-22.03	19.69	3.11	32.13	117	55	Peak
5	699.00	26.07	33.62	46.00	-19.93	20.81	3.43	31.79	100	56	Peak
6	818.70	28.79	34.17	46.00	-17.21	22.47	3.74	31.59	100	112	Peak



A D T

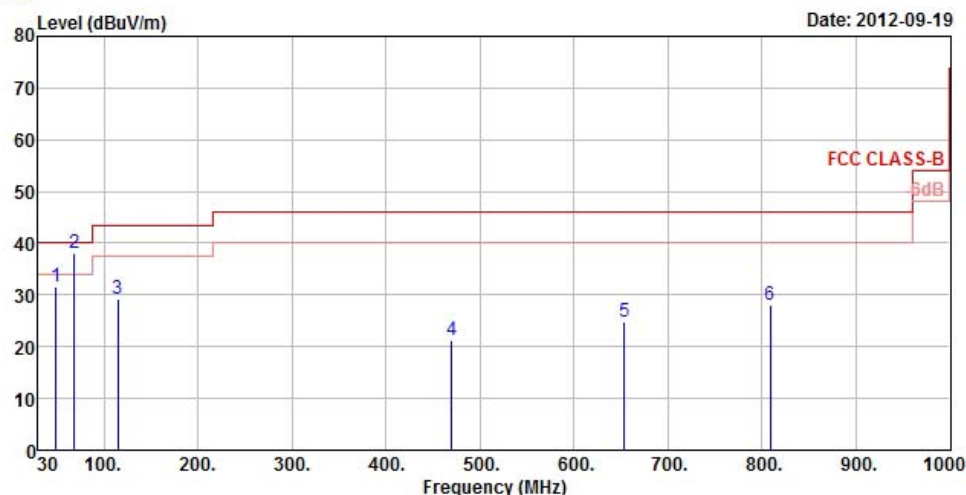


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6

Date: 2012-09-19



Site : 966 Chamber 5  
 Condition : FCC CLASS-B 3m ANT\_30M~1G\_LF VERTICAL  
 Brand/Model: F-04E  
 Remark : BT LE LF  
 Tested by : Kay Wu  
 Temperature : 25°C  
 Humidity : 65%  
 Plane : X

	Freq	Level	Read Level	Limit Line	OverAntenna Limit	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV	dBuV/m	dB	dB/m	dB	dB	cm	deg	
1	48.63	31.69	49.00	40.00	-8.31	13.18	0.76	31.25	100	183	QP
2 pp	68.07	38.17	58.02	40.00	-1.83	11.00	0.88	31.73	100	344	QP
3 pk	114.78	29.32	49.58	43.50	-14.18	10.46	1.15	31.87	100	241	Peak
4	470.10	21.22	33.70	46.00	-24.78	16.73	2.68	31.89	100	74	Peak
5	653.50	24.83	33.30	46.00	-21.17	20.26	3.26	31.99	100	312	Peak
6	808.90	28.15	33.54	46.00	-17.85	22.34	3.72	31.45	100	225	Peak

## 4.2 CONDUCTED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB $\mu$ V)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
  2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
  3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

### 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100289	Nov. 19, 2011	Nov. 18, 2012
RF signal cable Woken	5D-FB	Cable-HYCO2-01	Dec. 29, 2011	Dec. 28, 2012
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Dec. 30, 2011	Dec. 29, 2012
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 06, 2012	Jul. 05, 2013
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. The test was performed in HwaYa Shielded Room 2.
  3. The VCCI Site Registration No. is C-2047.



#### 4.2.3 TEST PROCEDURES

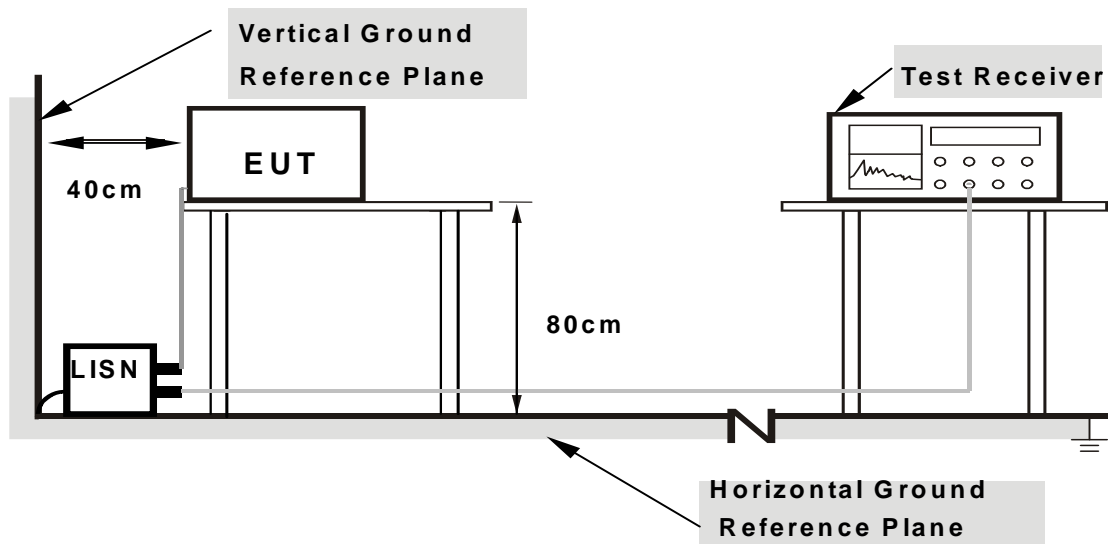
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

**NOTE:** All modes of operation were investigated and the worst-case emissions are reported.

#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.2.5 TEST SETUP



**Note:** 1.Support units were connected to second LISN.  
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

## 4.2.7 TEST RESULTS

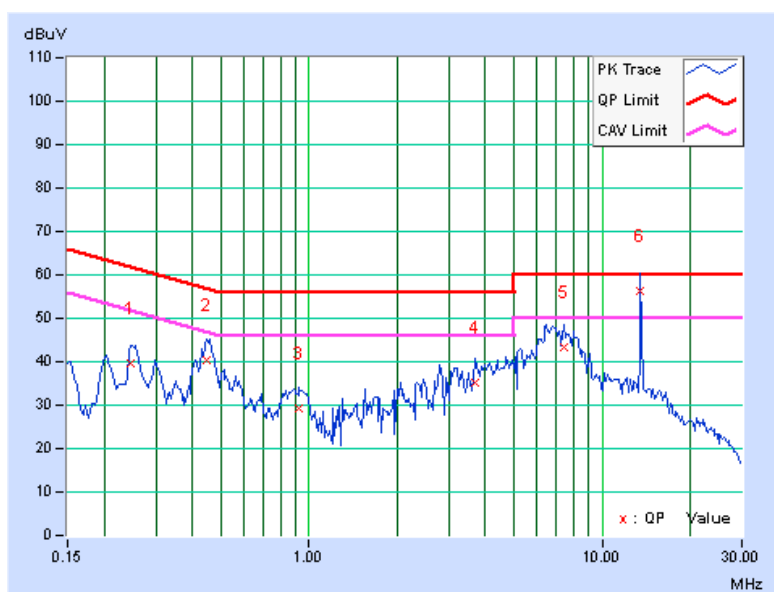
### CONDUCTED WORST CASE DATA:

PHASE	Line 1	6dB BANDWIDTH	9kHz
-------	--------	---------------	------

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.24766	0.15	39.32	33.57	39.47	33.72	61.84	51.84	-22.36	-18.11
2	0.44688	0.17	40.17	34.66	40.34	34.83	56.93	46.93	-16.59	-12.10
3	0.92734	0.19	28.94	21.52	29.13	21.71	56.00	46.00	-26.87	-24.29
4	3.70313	0.33	34.87	26.52	35.20	26.85	56.00	46.00	-20.80	-19.15
5	7.37109	0.39	42.96	32.06	43.35	32.45	60.00	50.00	-16.65	-17.55
6	13.55859	0.50	55.89	44.96	56.39	45.46	60.00	50.00	-3.61	-4.54

### REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

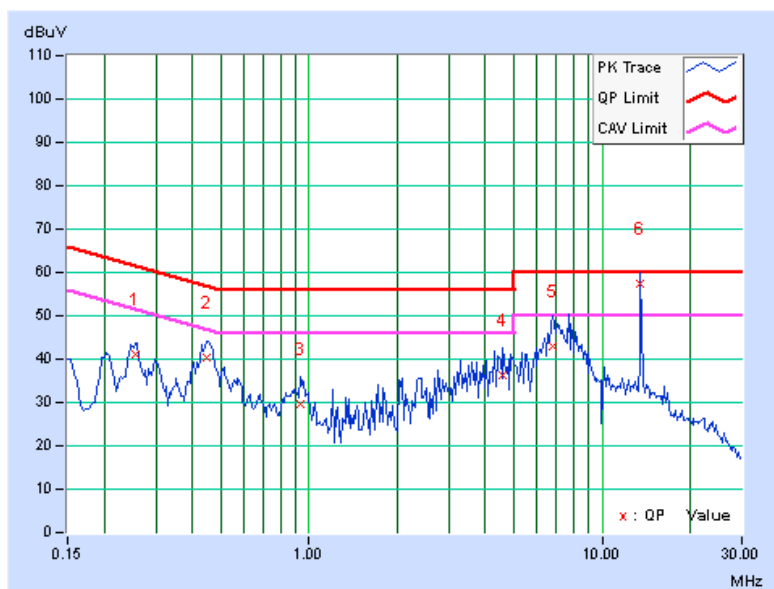


PHASE	Line 2	6dB BANDWIDTH	9kHz
-------	--------	---------------	------

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.25547	0.15	41.12	36.80	41.27	36.95	61.58	51.58	-20.31	-14.63
2	0.44688	0.16	40.25	34.72	40.41	34.88	56.93	46.93	-16.52	-12.05
3	0.93125	0.19	29.41	21.84	29.60	22.03	56.00	46.00	-26.40	-23.97
4	4.59375	0.36	36.09	27.24	36.45	27.60	56.00	46.00	-19.55	-18.40
5	6.82422	0.41	42.49	31.96	42.90	32.37	60.00	50.00	-17.10	-17.63
6	13.55859	0.57	56.95	46.19	57.52	46.76	60.00	50.00	-2.48	-3.24

#### REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

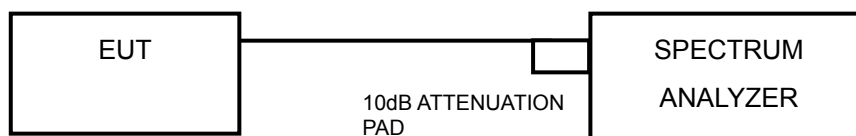


### 4.3 6dB BANDWIDTH MEASUREMENT

#### 4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 4.3.2 TEST SETUP



#### 4.3.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

#### 4.3.4 TEST PROCEDURE

1. Set resolution bandwidth (RBW) = approximately 1% of the emission bandwidth
2. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
3. Trace mode = max hold.
4. Sweep = auto couple.
5. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### 4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

#### 4.3.7 TEST RESULTS

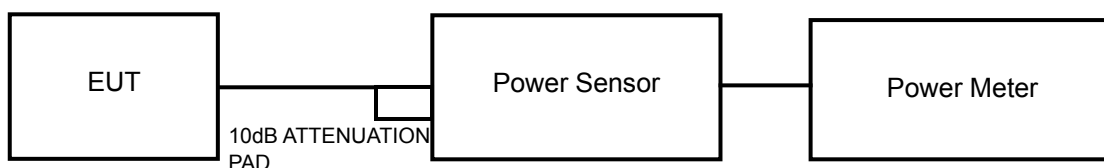
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (kHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	664.21	0.5	PASS
19	2440	662.72	0.5	PASS
39	2480	664.47	0.5	PASS

## 4.4 CONDUCTED OUTPUT POWER

### 4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 2400–2483.5 MHz: 1 Watt (30dBm)

### 4.4.2 TEST SETUP



### 4.4.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

### 4.4.4 TEST PROCEDURES

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the peak power level.

### 4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.

### 4.4.7 TEST RESULTS

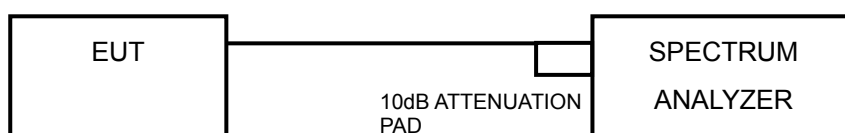
CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
0	2402	1.06	0.27	30	PASS
19	2440	1.09	0.38	30	PASS
39	2480	1.14	0.58	30	PASS

## 4.5 POWER SPECTRAL DENSITY MEASUREMENT

### 4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

### 4.5.2 TEST SETUP



### 4.5.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

### 4.5.4 TEST PROCEDURE

- Set the RBW = 100 kHz, VBW = 300 kHz, Detector = peak.
- Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
- Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
- Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where  $BWCF = 10\log(3 \text{ kHz}/100\text{kHz})$

### 4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

### 4.5.7 TEST RESULTS

Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	2402	-3.67	-18.87	8	PASS
19	2440	-3.25	-18.45	8	PASS
39	2480	-2.68	-17.88	8	PASS

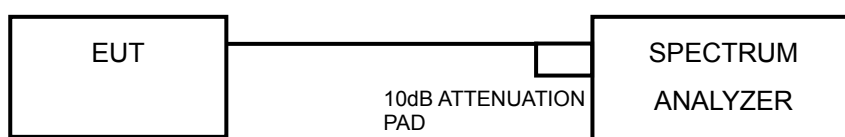


## 4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

### 4.6.1 LIMITS OF OUT OF BAND EMISSION MEASUREMENT

Below  $-20\text{dB}$  of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 4.6.2 TEST SETUP



### 4.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

### 4.6.4 TEST PROCEDURE

#### MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW  $\geq$  300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

## MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW  $\geq$  300 kHz.
3. Set span to encompass the spectrum to be examined
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.

### 4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.6.6 EUT OPERATING CONDITION

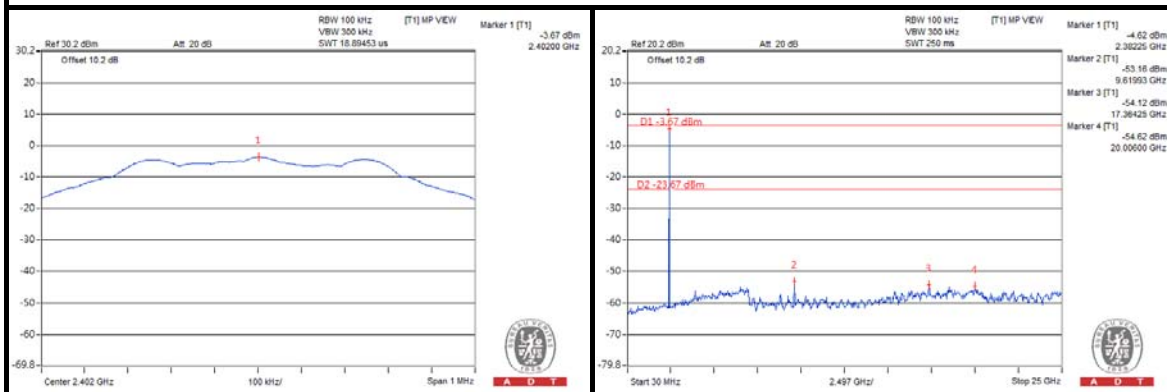
Same as Item 4.3.6

### 4.6.7 TEST RESULTS

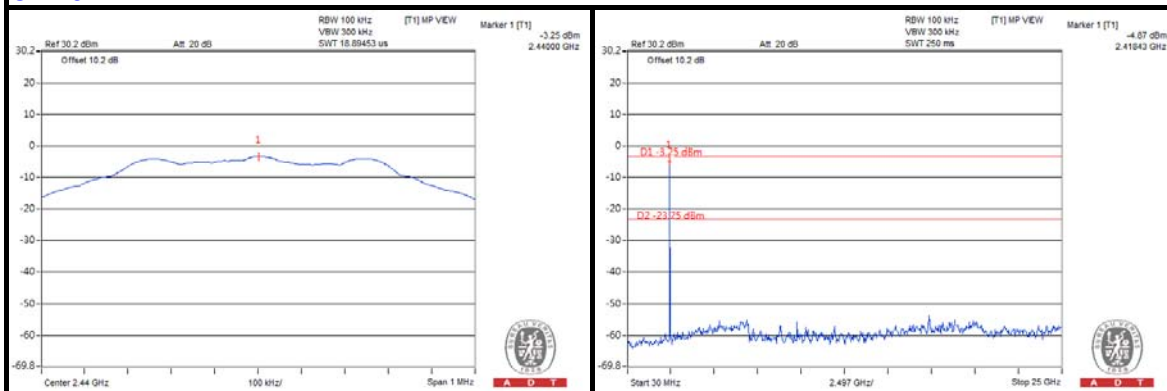
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

## 4.6.8 TEST RESULTS

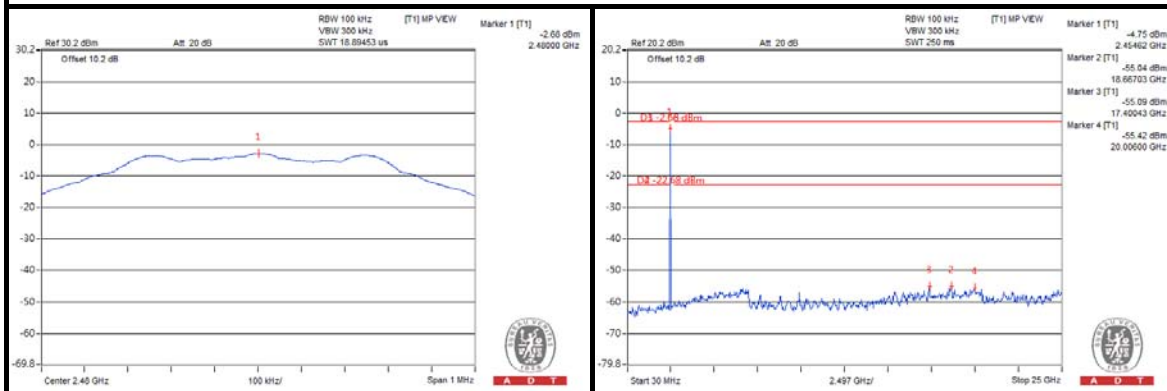
### CH 0



### CH 19



### CH 39



## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

## 6. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

**Linko EMC/RF Lab:**

Tel: 886-2-26052180

Fax: 886-2-26051924

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**Web Site:** [www.bureauveritas-adt.com](http://www.bureauveritas-adt.com)

The address and road map of all our labs can be found in our web site also.

## **7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No modifications were made to the EUT by the lab during the test.

**--- END ---**